



TITLE:

An Attempt at Integrated Environmental Governance

AUTHOR(S):

Takebe, Takashi

CITATION:

Takebe, Takashi. An Attempt at Integrated Environmental Governance.
京都大学生物資源経済研究 2007, 12: 1-16

ISSUE DATE:

2007-03-25

URL:

<http://hdl.handle.net/2433/54277>

RIGHT:

An Attempt at Integrated Environmental Governance

Takashi Takebe

武部 隆 「統合的環境ガバナンス試論」

環境ガバナンスとは、持続可能な社会の達成に向け、多様な環境財を利用・保全・管理するための経済社会の構築を指している。ブルントラント委員会報告『地球の未来を守るために（原題：Our Common Future）』（1987年）では、持続可能な発展を「将来の世代のニーズを満たす能力を損なうことなく現在の世代のニーズを満たすような発展」としているが、本稿でいう持続可能な社会とは、同報告の延長線上に位置づけられるもので、社会経済の活動から生じる自然環境への環境負荷を、自然が耐えうる自然の再生可能・自浄可能な範囲内に抑えながら、しかし持続的な発展を可能とする経済社会のことである。

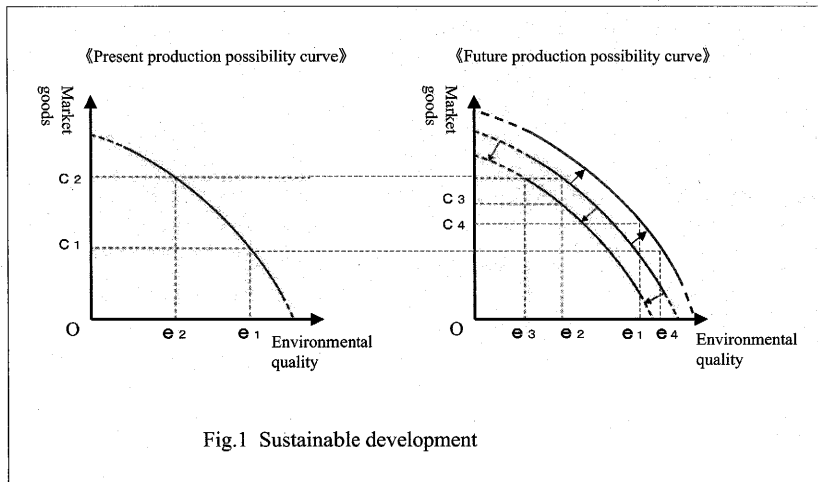
このような環境ガバナンス研究の方法として、①契約論的な視点に立った環境ガバナンス、②社会関係資本（SC：Social Capital）の視点に立った環境ガバナンス、③リスク分析の視点に立った環境ガバナンス、それに、④環境効率性の視点に立った環境ガバナンス、などを考えることができる。そして、これら四つの環境ガバナンス研究の方法については、それぞれを独立させて思考することもできるし、また、それぞれを関連づけながら統合的に思考することも可能である。本稿では、環境ガバナンス研究の方法に関して、以上四つの方法を独立的にまた統合的に検討し、環境ガバナンス研究の分析視角について試論を提起する。

1. Introduction

Environmental governance is defined as establishment of an economic society where diverse environmental goods are utilized, preserved, and managed in order to attain a sustainable society. A sustainable society means an economic society that controls environmental impacts that come from social economic activities and affect on natural environments (i.e. resource extraction from the environments and its output and disposal to the environments) within the renewable and self-cleaning capacity of the nature, and yet enables its sustainable development.

In *Our Common Future*, the Brundtland Commission Report in 1987, sustainable development was defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. Fig. 1 illustrates this relation graphically.¹⁾ Sustainable development is a development of an economic society which will create a “future production possibility curve” outside of the “present production possibility curve” on a coordinate plate with x-axis of “environmental quality” and y-axis of “market goods”. We may say, therefore, the question whether we can establish a sustainable society or not hangs on how the present generation in the present moment chooses environmental qualities and properties in market.

The grasp of environmental governance as above will bring about several approaches to research it: environmental governances 1) from the contractual viewpoint, 2) from the social capital (SC) viewpoint, 3) from the risk analysis viewpoint, 4) from the environmental efficiency



viewpoint, and so on.

The approach 1) aims organization establishment by introducing contractual conception and can be renamed 'Environment contract governance'. The approach 2) is oriented toward SC adequacy and condition preparation for that, and can be renamed 'Environment associate governance'. The approach 3) aims system establishment for risk management and can be renamed 'Environmental risk governance'. And the approach 4) is oriented toward making framework for achieving environmental efficiency and renamed 'Environmental efficiency governance'.

We can study these four approaches not only individually, but also integratively, relating them with each other. In this paper we think over these four approaches both individually and integratively, and present an attempt at the analysis angles of environmental governance study.

2. Environmental governance from the contractual viewpoint

(1) A complete / incomplete contract and incentives

Governance that aims organization establishment for environmental governance based on contract theory can be called environment contract governance. According to contract theory, incentives for environmental friendliness are to be worked directly into the contract when it is complete, while in the case of incomplete contract incentives are not worked into the contract but given indirectly to the parties concerned by virtue of laws and organization / system.

It is very important to grasp environmental governance according to contract theory as above and to plan to build an organization of environment-friendly type, focusing on the incentives of both parties of the contract. In this section, we especially examine an environmental governance aided by incomplete contract theory, in which reforms in economic systems such as property rights, decision rights, and negotiation skills will change the economic conditions in concerned parties' outside options and give indirect influence on concerned parties' incentives about environmental friendliness.

For example, let us assume a factory produces products and makes a profit, belching out its

soot and smoke. The local inhabitants are suffering an external diseconomy from the soot and smoke. The factory can invest to prevent it, and the judgment whether they invest or not is in the hand of the factory and it is impossible to make a contract of such prevention investment between the factory and the inhabitants; namely, the contract about investment is incomplete. And to make the discussion simple, let us assume that in the negotiation concerning the income distribution or share, the negotiation skills belong 100% to the factory (inhabitants cannot but say yes to the factory in the share negotiation).

Under these assumptions, we will show with simple figures how the investment incentives differ depending on which side decides product amount, the factory or the inhabitants, and examine the idea of environmental governance from the incomplete contractual viewpoint.²⁾

(2) Soot and smoke prevention investment and product amount decision

First, we examine the case the factory decides product amount. Two upper figures in Fig. 2 show this case. Upper left shows the case the factory does not invest in soot and smoke prevention, and upper right the case the factory does invest. The investment cost is shown as the size of the square on the left of the upper right figure.

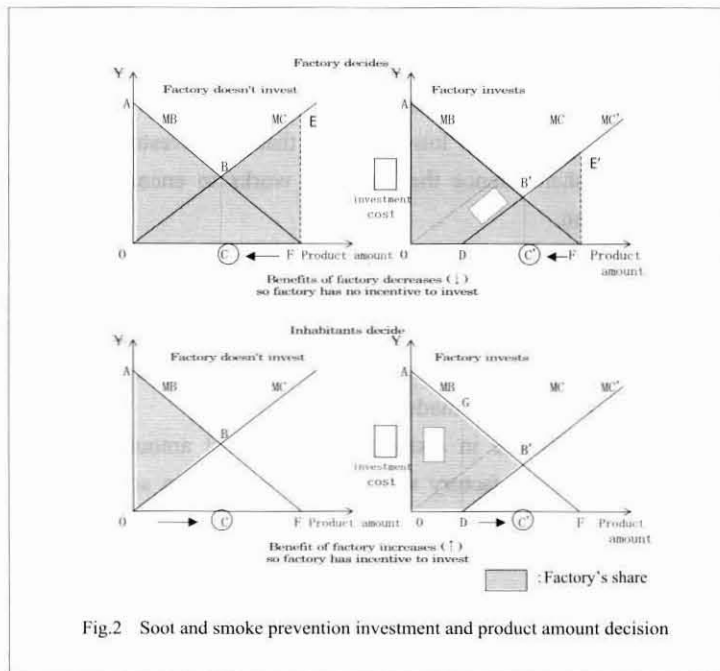


Fig.2 Soot and smoke prevention investment and product amount decision

When the factory doesn't invest, it tries to enlarge production up to point F, where marginal benefit (MB) is zero. But after negotiation with the inhabitants, the factory decreases product amount and makes product of the Pareto efficient point C, i.e. the intersection point of MB curve and inhabitant marginal cost (MC) curve. At this point, the factory gets the share that corresponds to the area EBAOF, i.e. sum of production-based profit (AOCB) and income-transfer-based profit from the local inhabitants (EBCF).

On the other hand, when factory does invest, MC curve shifts downward, and the Pareto efficient product amount after the negotiation accordingly shifts rightward to point C', i.e. the two curves' intersection. The factory's share is the area of E'B'AOF minus investment cost. If we go further on this assumption based on the two figures, we see the investment causes decrease in the factory's share; thus the factory has no incentive for investment on soot and smoke prevention.

Then, how is the case the local inhabitants decide product amount? The two lower figures in Fig.2 illustrate this. Lower left figure shows the case the factory does not invest in soot and smoke prevention and lower right figure the case the factory does invest. Investment cost is the same with the case above.

When the factory does not invest, the local inhabitants try to reduce the factory product amount to zero. But after the negotiation, the inhabitants agree that the factory will increase product amount and make product of the Pareto efficient point C, i.e. the intersection point of MB curve and MC curve. At this point, the factory gets the share that corresponds to the area AOB: production-based benefit (AOCB) minus income transfer to inhabitants as compensation cost (BOC).

When the factory does invest, MC curve shifts downward. If negotiation is not held, the inhabitants have the factory produce an amount corresponding to point D. If negotiation is held, Pareto efficient product amount shifts rightward to C', i.e. the intersection of the two curves, and the factory's share is AODB' minus investment cost. If we go on the assumption in the same way as above, we see in the two lower figures that the investment by the factory results in increase of the factory's share; hence the incentive works to encourage the factory to invest on soot and smoke prevention.

As seen above, even though the investment decision is left to the factory, the difference between whether the decision rights of product amount belong to the factory or to the inhabitants makes the factory either invest or not. In the instance above, when factory decides product amount, soot and smoke prevention investment is not made, and when inhabitants decide it, investment is made—or can possibly be made.

Thus, depending on the difference in distribution of product amount decision rights between the factory and the inhabitants, the factory makes an investment in some cases and does not in other cases.

In the study above, we have assumed for the sake of simplicity that 100 % of the negotiation skills belong to the factory, i.e. the inhabitants cannot but say yes to the factory in the share negotiation. However, even if we assume that 100 % of the negotiation power belongs to the inhabitants, i.e. the factory cannot but say yes to the inhabitants in the share negotiation, the result is the same. When the factory decides product amount, no incentive is generated in the factory to invest on soot and smoke prevention, and when the inhabitants decide product amount, incentives are generated—or can possibly be generated—to invest on it. However, it goes without saying that, in the share negotiation, the party with stronger negotiation skills gets larger share, so the factory's share is larger when the factory has 100% of negotiation skills than when the inhabitants have 100% of them.

Similarly, decision right is also important. The factory's share is larger when product amount

decision right belongs to the factory than when it belongs to the inhabitants, but we won't need any further discussion.

Finally let us refer to the case that the inhabitants decide product amount. Such assumption seems nonsense, but the fact is that external diseconomies brought by companies are kept watched more and more carefully than before by environmental monitoring activities of non-profit/non-governmental organizations (NPO/NGO). We guess such monitoring and critical activities against companies will be severer in the future. We are finding a sign of change in the product amount decision right that factory has had as a matter of course.

3. Environmental governance from the social capital viewpoint

(1) Social capital

Environmental governance from the social capital viewpoint, or environment associate governance is oriented to environment-related social capital adequacy and condition preparation for that, and it aims to attain a sustainable society. Social capital is "characterized by the thickness of the multi-layered network based on trust and reciprocity,"³⁾ but such social capital exists, in reality, as non-profit organizations or networks of such organizations. We expect thickness of social capital, i.e. abundance of non-profit organizations and their networks, will be helpful in active dealing with the social issues which companies and the government could not deal enough with, e.g. welfare, social education, environmental improvement, human rights protection. From the environmental governance standpoint, we expect also that such abundance will make it surer to attain a sustainable society environmental governances aim at.

On the assumption that the parties concerned are a few in number, and there is no wealth effect, and besides the negotiation cost is limitlessly close to zero, externality internalization scheme to solve the problem of externality internalization through negotiation among the parties concerned corresponds to the Coase Theorem.⁴⁾ In this case, social capital thickness, i.e. abundance of non-profit organizations and their networks, may be helpful to attain externality internalization efficiently even when parties concerned are comparatively a lot in number. It is because thickness and abundance of social capital bring about information disclosure of the parties concerned and ensurance of accountability, and by inventing a transparent decision process, the possibility to validate the Coase Theorem will be much greater, even in the case there are many parties concerned.

For environmental governance we cannot ignore non-profit organizations as socio-economic entities. Further consideration of them based on the recognition as above will be of some help for environmental governance study from the social capital viewpoint. We will refer first to the system reform of public benefit corporations and nonprofit corporation theory.

(2) The reform of public benefit corporation system

In May 2006 passed the three bills of the reform of public benefit corporation laws. They have a structure of a two-storied house, and one of the two basic parts, namely the first floor of the house, is "the general incorporated association and foundation law" that regulates the

bodies without tax incentives given, and the other part, the second floor of the house, is “the charitable status recognition law” that regulates the requirements and procedures to obtain charitable status with tax incentives. In addition, “the relative transition, modification and repeal law” prepares the relative two laws.

“The general incorporated association and foundation law” regulates the system, organization, adjustment, merger, etc. of a “general nonprofit association or foundation” that can get a legal status simply by normative system (registration), whether it may have charity or not, and it being a non-profit corporation, distribution of the surplus funds among those employed (or founders) is not permitted. The law also introduces disclosure of its financial condition once in a year and a system of representative action suit by those employed.

In “charitable status recognition law”, recognition system of a non-profit charitable corporation, its recognition criteria and requirements, supervision on a charitable corporation, etc. are regulated, and it is described that Prime Minister (or the prefecture mayor if the corporation’s activity is limited to a distinct area) is in charge of charitable status recognition of a non-profit corporation. A corporation is recognized if it meets the recognition criteria based on the opinions of a committee of representative system composed of experts (and under the system of similar functions if the corporation’s activity is limited to a definite area).

Incidentally, the direct starting point of the sudden discussion in charitable corporation system reform was the following two suggestions: “the Radical Reform of Public Benefit Corporation System” pointed out in “the General Plans for Administrative Reform” (approved in the cabinet in December 2000), and “Awareness of Public Benefit Corporation—toward Radical Reform” that the Cabinet Secretariat Office for Administrative Reform released in July 2001. And after “Measures for Radical Reform of Public Benefit Corporation System” and “Reform plans of administrative participation in public benefit corporations”, both approved in the cabinet in March 2002, “Toward Radical Reform of Public Benefit Corporation System (Agenda)” was announced by the Cabinet Secretariat Office for Administrative Reform in August 2002, and “Treatment of Non-Profit Corporations” by Working Group of Governmental Tax System Research Non-Profit Corporate Tax in February 2003.

The meanings and purposes of public benefit corporation system reform, according to “Toward Radical Reform of Public Benefit Corporation System (Agenda)” by the Cabinet Secretariat Office for Administrative Reform, are 1) positive positioning of private non-profit activities in socio-economic system and promotion of their activities, and 2) effective dealing with the criticism or pointing out that the permission system by competent authorities are obstructing non-profit activities that follow the fashions of the day, and that criteria of charitable status are unclear, etc.

Thus the Cabinet Secretariat Office for Administrative Reform came out with a new orientation of non-profit corporation system by categorizing public benefit corporations (Civil Code corporations) and mutual benefit corporations together as “non-profit corporation” and employing a simple normative system (registration) on their establishment. In addition, Working Group of Governmental Tax System Research Non-Profit Corporate Tax showed the idea that corporate tax of “non-profit corporations” should be principally taxed and if recognized to have charity they should be exempted.

Three laws relating to the reform of public benefit corporation system have thus been passed. Next we will examine the meaning of them from the non-profit corporation theory viewpoint.

(3) Non-profit corporation theory

In the reform of public benefit corporation system, the government tries to locate a variety of populations that make private non-profit activities positively in the socio-economic system and to accept them to be socio-economic entities as important as private sectors (i.e. private business corporations) and public ones (i.e. the central and local governments). Among such populations are included both those of public benefit purpose and of mutual benefit purpose.⁹⁾

This idea is based on non-profit corporation theory and is close to Yoshiyuki Sato's. In fact, Sato advanced his idea in the 3rd meeting of the "Conference of Experts about Public Benefit Corporation System Reform" on January 23, 2004, with a title "A Reform of Voluntary Sectors and the Social System—A social background where public benefit corporation reform is needed".

He also discussed in the "NPO Sectors and Civil Democracy" in *NPO and Business Administration*, written and edited by Yasushi Okubayashi, et al., Chuo-Keizai- Sha, 2002, that "Except for the national and market economy, there has been 'another economy'. There has been a territory of 'socio-economy' as a 'mutual sector' in which civilians form an association and cooperate with one another to joint-produce necessities and services." Sato uses the word *association* exactly for non-profit organizations (both corporations and non-corporations) and the networks they create.

Talking of non-profit corporation theory, *Association* in France is what we cannot disregard. In the 3rd meeting of the "Conference of Experts" above mentioned, Atsushi Omura commented about *Association* in France in the title "'Freedom of Association' and 'Non-Profit Organization'—Focusing on the Case of France". In France, Association System has been prepared early on (the law of Association, 1901) in order to ensure legally the socio-economic entities in charge of private non-profit activities.

In the public benefit corporation system reform our government has promoted, public benefit corporations (Civil Code corporations) and mutual benefit corporations are gathered and grouped into "non-profit corporations" and their establishment is by normative system (registration), and corporate tax is principally taxed, but if recognized to be charitable it is exempted. If we take a look in Association Law of France, it will be clear that those decisions were under the awareness of the association idea of France.¹⁰⁾ But it is noticeable that incorporated foundations are not included in the association of France, while they are included in the group of "non-profit associations" in the public benefit corporation system reform.

Public benefit corporation system reform should be placed in such context as above. It may seem really clumsy that mutual benefit corporation system was abolished only four years after its birth, but easier establishment of non-profit corporations (i.e. general incorporated associations and foundations) by introducing normative system (registration) will lead to thicker social capital, or in other words to more abundance of the non-profit organizations and the networks they build, so we can accept the changes as a condition preparation for more active environment improving and maintaining activities. The system reform of public benefit corporations was thus

an inevitable way to go from the environmental governance viewpoint.

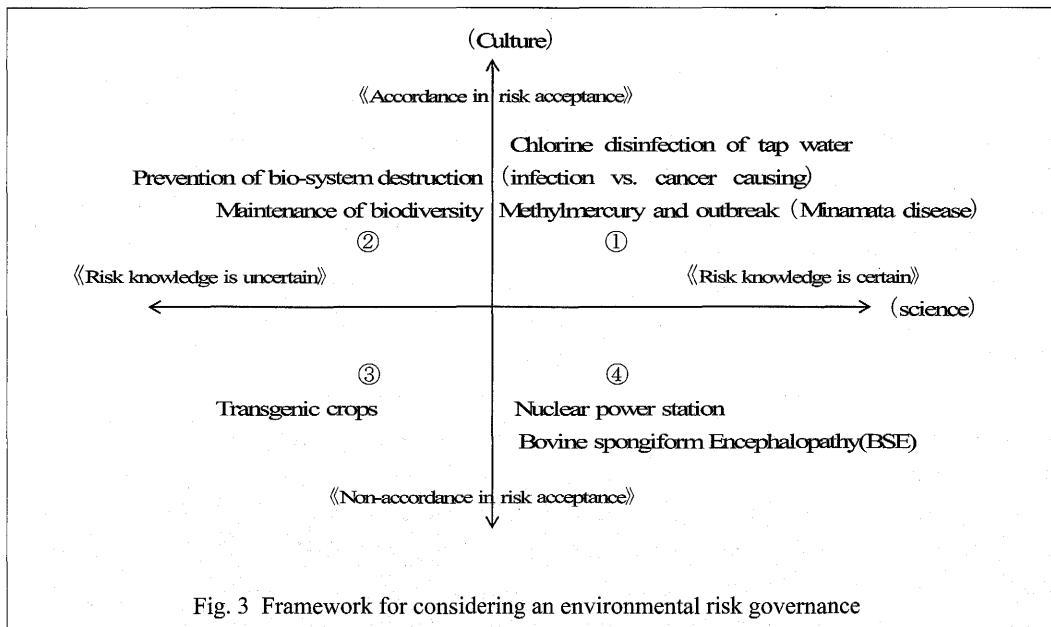
4. Environmental governance from the risk analysis viewpoint

(1) Various environmental problems classified by knowledge and acceptance

Environmental governance from the risk analysis viewpoint is environmental risk governance. A risk is composed of the degree of probability an unfavorable phenomenon occurs and the amount of damage it brings about. Such risk analysis includes, in general, the three elements of "risk valuation", "risk management", and "risk communication". Certainly this risk analysis method is important to study environmental risks, but too generalized to treat concrete environmental risk problems satisfactorily.

Besides, when the knowledge about a risk is certain or fairly certain, this risk analysis is effective, but when the knowledge is uncertain or fairly uncertain, there remain some doubts about applying the idea directly. In addition, as far as a risk problem is concerned, there is a variety in its acceptance, and we can or cannot get general public agreement as the case may be.

Thus, as a framework for considering environmental governance from the risk analysis viewpoint, we will introduce a method as shown in Fig.3. The horizontal axis indicates the certainty of the knowledge (rightward shift means "higher certainty of risk knowledge") and vertical axis risk acceptance (upward shift "higher accordance of risk acceptance"), so the four quadrants can be examined separately.⁷⁾



A few environmental issues are shown in each quadrant of the plate. We will describe them respectively following Saburo Ikeda's way of analysis.

In Quadrant 1 ('Risk knowledge is certain' and 'there is accordance in risk acceptance'), accurate risk calculation and valuation are possible and there is accordance in risk acceptance, so we can apply the technique of risk analysis to the problems here and solve them in a method of engineering and applied science. Examples of this type of environmental problems are the problem of chlorine disinfection of tap water and cancer causing, and the case of methylmercury and outbreak of Minamata disease.

In Quadrant 2 ('Risk knowledge is uncertain' and 'there is accordance in risk acceptance'), as risk knowledge is not certain in spite of accordance in risk acceptance, we need to make effort for more detailed monitoring and more precise risk calculation. Development of risk valuation and high degree monitoring for precise risk calculation are also the themes for more effective risk analysis technique. As examples of Quadrant 2, problems of prevention of bio-system destruction and maintenance of biodiversity are categorized.

Quadrant 4 ('Risk knowledge is certain' and 'there is not accordance in risk acceptance') is a domain where there is no accordance in risk acceptance though risk knowledge is certain. Risk Communication in risk analysis technique is most necessary in this quadrant. In order to get accordance of the risk acceptance, development of accordance technique is needed. Examples in this quadrant are the cases of nuclear power stations, bovine spongiform encephalopathy (BSE), etc.

The last Quadrant 3 ('Risk knowledge is not certain' and 'There is not accordance in risk acceptance') is a domain that we cannot deal with by means of so-called risk analysis composed of "risk valuation", "risk management", or "risk communication". Here we cannot grasp risk probability at all, nor can we get accordance about risk acceptance, so it is the most difficult to treat problems in this quadrant from the environmental risk governance viewpoint. An example in this quadrant is introduction of transgenic crops.

We have seen the method of considering four domains respectively in the plate with horizontal axis indicating the certainty of knowledge about risks and vertical axis indicating acceptance about risks. It will make it possible to consider environmental risk problems concretely, as we can take proper risk management strategies and system arrangements corresponding to the quadrant the problems belong to. And such method will successfully lead to a comprehensive approach of environmental risk governance as a result.

- (2) The case of "risk knowledge is uncertain and there is accordance in risk acceptance", for instance

Because of limited space, we cannot discuss all the four quadrants above, so let us just see a case of Quadrant 2, i.e. the pattern of "Risk knowledge is uncertain" but "there is accordance in risk acceptance", with the example of the problem of prevention of bio-system destruction.

In Quadrant 2, there is accordance in risk acceptance but risk knowledge is not certain. The risk analysis composed of "risk valuation", "risk management", and "risk communication" can be effective here. But we must not forget that it can be effective only with the effort of making uncertain risk knowledge more certain. We will consider it by the use of Fig. 4, following Ikeda's way of analysis.⁸⁾

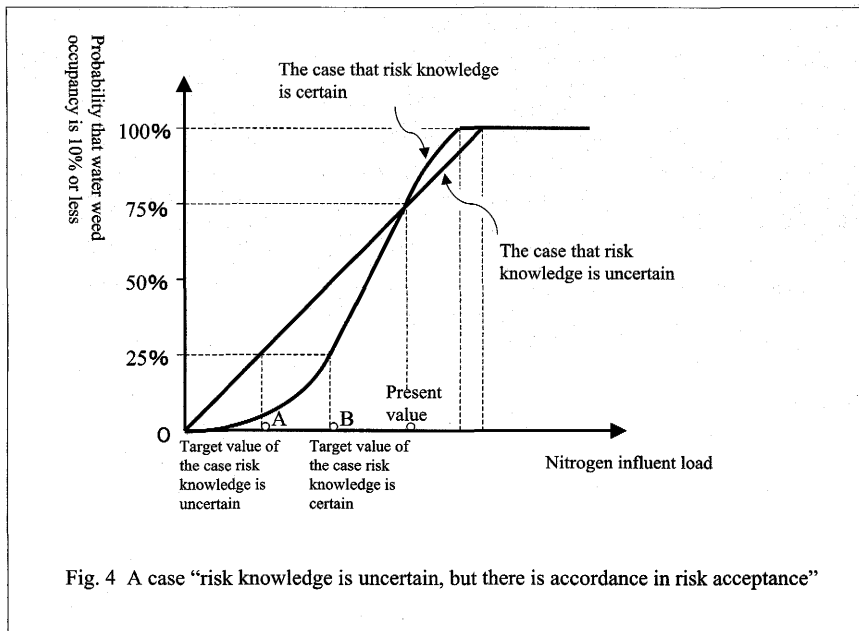


Fig. 4 indicates dose-response relationship concerning ecological risks. Concerning ecological risks, the dose-response relationship is popularly used, in which the horizontal axis represents amount of hazard such as pollutant influx, and the vertical axis represents collective endpoint generation probability such as extinction probability of the taxon in question.⁹⁾

If we think the relationship, for instance in a lake, between ‘nitrogen influent load’ and ‘probability that water weed occupancy goes 10% or less (i.e. water weed extinction probability)’ caused by nitrogen, we cannot but assume a dose-response relationship shown as a rising line in Fig. 4, keeping decent safety margin, as our risk knowledge about the extinction of the weed in question is uncertain.

But suppose the risk knowledge concerning the extinction becomes certain as a result of careful survey research and monitoring, and the situation is identified as the logistic curve in the Fig. 4. Then the relationship between extinction probability of water weed in question and nitrogen influent load becomes certain and thus it becomes possible to make an apt judgment.

For example, if the aim is set that the “probability of the water weed occupancy being 10% or less (water weed extinction probability)” should be suppressed to under 25%, the knowledge about extinction risk gets certain, and consequently, the aimed value (or permissible value) of nitrogen influent load is relaxed from A to B, and as a result, the policy cost for attainment of the aim gets lower than when risk knowledge is uncertain.

Thus, in Quadrant 2 (“Risk knowledge is uncertain” but “there is accordance in risk acceptance”), we need to endeavor to make monitoring more detailed and risk calculation more minute. The theme is investigation of risk valuation and high-level monitoring for minute risk calculation.

In this section, we have seen environmental governance from the risk analysis viewpoint. We adopted, as a framework of consideration, a method of examining four quadrants respectively in

a plate with horizontal axis indicating the certainty of knowledge about risks (the risk knowledge is more certain rightward), and vertical axis indicating acceptance about risks (the risk acceptance gets more accordance upward).

From the standpoint of environmental governance, it is true, the idea of risk analysis is important. But we judge, if it is used, not straight, but together with above-mentioned four quadrant (or domain) idea of combination of 'risk knowledge certainty' and 'risk acceptance', it will result in a more practical environmental governance from the risk analysis viewpoint.

5. Environmental governance from the environmental efficiency viewpoint

(1) Progress of environmental efficiency

A governance oriented to making a framework for environmental efficiency achievement is called environmental efficiency governance and is the fundamental of the environmental governances. "Environmental efficiency" means 'amount of economic activities' per environmental load unit (resource extraction from environment and output/disposal to environment).

From the standpoint of environmental governance, it is important to suppress environmental load to the range of environmental constraint (amount of environmental acceptance) by progressing environmental efficiency constantly. It is necessary, for this purpose, to progress environmental efficiency at a higher speed than the growth rate of economic activities. From this point of view, we should establish an ecological economics on the whole acknowledgement that human socio-economic activities and environments are related with each other, and then reexamine the traditional environmental policy and grope for the orientation of 21st century-type ecological environmental policy and the way to build a structure of an environment-friendly type.

Environmental and energy problems hold the key to sustainable growth of global economy in the 21st century. It can be safely said that our future society won't progress without development of environment-conscious technology or promotion of environment-conscious industries.

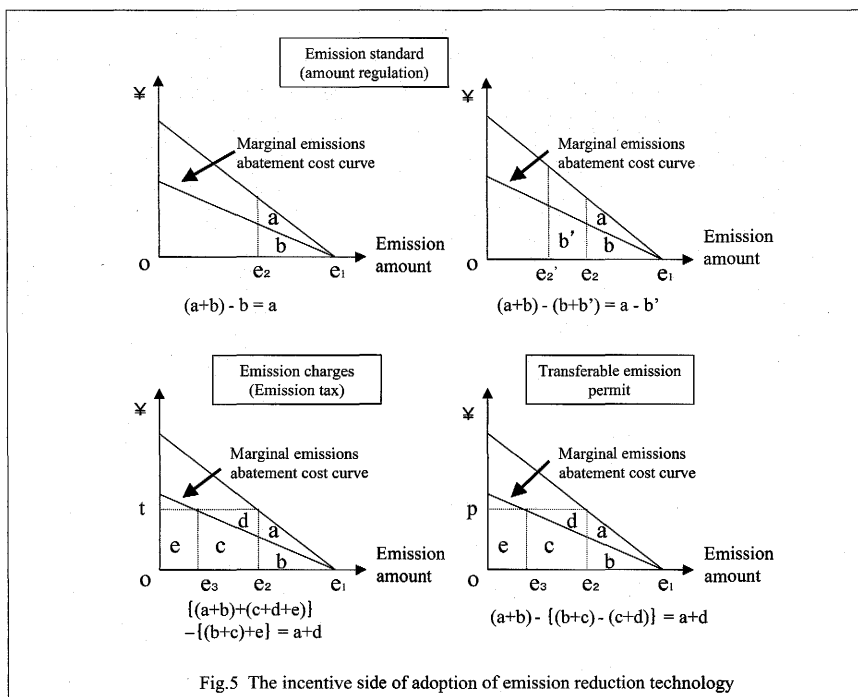
Masahiko Aoki calls the energy-saving, environment-conscious technology "eco-friendly technology", and advocates an orientation to which Japan should lead the world as an eco-friendly technology-oriented country, which is what Japan ought to be in the future.¹⁰ He places the development ability of eco-friendly technology as one of the "ultimate resources" and underlines the importance of developing ability of persistent creation of eco-friendly technology (i.e. human and intellectual resources) that will be selected out in the competitive market.

Environmental governance from the environmental efficiency viewpoint thus contains system making for yielding development ability of eco-friendly technology. In the following chapters we will see, from the above-mentioned viewpoint, the systemic frameworks that give incentives for eco-friendly technology development.

(2) The incentive side of adoption of emission reduction technology

Fig. 5, taking development of pollutant emission reduction technology as an example, shows what kind of systemic factors are effective for the corporate concerned to develop emission reduction technology, in the following three cases: emission standards (amount regulation),

emission charge (emission tax), and transferable emission permit.¹¹⁾



In each of the four figures, the upper-located marginal emissions abatement cost curve shows the case when the corporation continues emission reduction, using present emission reduction technology, and the lower-located (shifted) marginal emissions abatement cost curve shows the case when the corporation reduces emission by the use of emission reduction technology expected to be introduced in the future by the technological development.

In the figure of emission standards, when emission standard amount is reduced from e_1 to e_2 , the cost of emission reduction by the use of developing technology is lower by a [$=(a+b)-b$]. Therefore, the result is that there is an incentive in technology development of pollutant emission reduction. But if emission standard amount is expected to be intensified to e_2' immediately after e_2 , even by the use of developing technology, the cost will go down only $a-b'$ [$=(a+b)-(b+b')$], and in some cases $a-b'$ can be a negative value. Thus the incentive of development of emission reduction technology of the corporation concerned is much weakened in such case.

On the other hand, in the cases of emission charge and of transferable emission permit, the cost of emission reduction by the use of developing technology gets lower by $a+d$ in both cases, and the result is that in each case the corporation will get more incentives of development of pollutant emission reduction technology than in the case of emission standards.

Now, in the left bottom figure of emission charges, when t is an emission charge per emission unit, and in the right bottom figure of transferable emission permit, when p is a price per emission permit unit, it should be focused that the same result $a+d$ comes both from

$\{(a+b) + (c+d+e)\} - \{(b+c) + e\}$ in the case of emission tax charges, and from $(a+b) - \{(b+c) - (c+d)\}$ in the case of transferable emission permit.

Among the above-mentioned three systems that give incentives to development of emission reduction technology, the incentives from emission charges and transferable emission permits are placed in the same level and that of emission standards is in the lower level. Needless to say, system construction that enables successful generation of ability of eco-friendly technology development will have difficulties without our paying attention to these points.

6. Conclusion

In the chapters above, we have examined the basic lines of thinking in the separate studies of the four methods of environmental governance. Moreover, we have additional possibility to consider these individual methods synthetically or integratively and make a method that reflects reality more properly. We will sketch, in conclusion, a way of integrated study in environmental governance on the premise of the four analysis angles of environmental governances.

First, we try to integrate "horizontally" the environmental governances at the four different analysis angles, as in Fig. 6. The integration level may be either regional, national, multinational, global, or else, and one can begin with what is one's greatest concern.

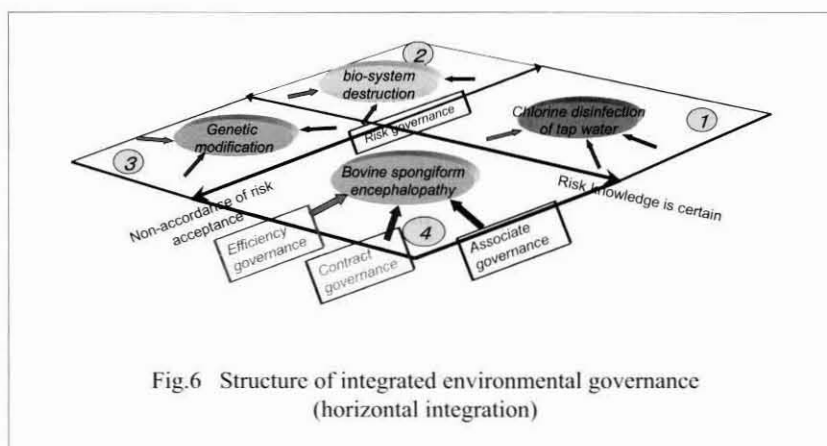


Fig.6 Structure of integrated environmental governance (horizontal integration)

In this occasion, with the environmental governances from the risk analysis viewpoint using as axis, you integrate necessary environmental governances from the other three analysis angles in a necessary order. Concretely speaking, you should first categorize the risk problems in question into the four quadrants by degree of risk knowledge and risk acceptance, paying attention to the differences among the risk acknowledgement structures of various problems. Then, concerning the categorized environmental problems in question, necessary environmental governances from the other three angles should be mobilized in a necessary order to make a "horizontal" integration, and thus environmental governances favorable for the environmental problems in question are designed.

After the 'horizontal' integration comes 'vertical' integration as is shown in Fig.7. We investigate the possibility of integration toward 'vertical' multi-layering of such as regional, national, multinational, and global levels. The layers' order can be different in each environmental problem. Apart from the order, multi-layering of levels and 'vertical' integration can be helpful to make it possible for the environmental problem to get a more adequate reality-reflecting method.

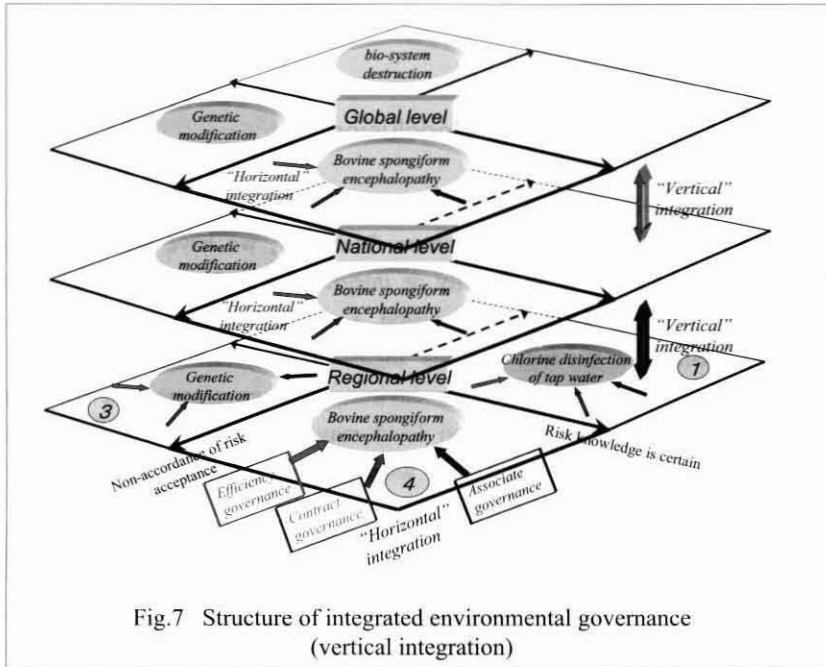


Fig.7 Structure of integrated environmental governance (vertical integration)

It is important to search, by the use of this multi-layered structure, to what level of environmental governance belongs the solution of the problem, or in other words, to what level of the governance belongs the driving force that moves (or is good enough to move) the multi-layered structure. The two steps of the first "horizontal" and then "vertical" multi-layered integration will help you establish the favorable method of integral environmental governance study of the environmental problem in question.

NOTES

¹⁾ FIELD, B.C., transl. by Jiro AKITA, et al., *Environmental Economics: An Introduction* (Kankyo Keizaigaku Nyumon, in Japanese), Tokyo, Nippon-Hyoron-sha, 2002, p.31, was referred to and revised for this paper's purpose.

²⁾ YANAGAWA, Noriyuki, *Keiyaku to Soshiki no Keizaigaku* (Economic Theory of Contract and Organization), Tokyo, Toyo Keizai Shimposha, 2000, Chap. 1, 'Hu-kanbi Keiyaku no Kangaekata (A View to incomplete contracts)', was referred to and revised for this paper's purpose.

³⁾ From "Introduction" of MOROTOMI, Toru, *Kankyo* (The Environment), Tokyo, Iwanami Shoten, 2003. According to Naoto YAMAUCHI, social capital is "an invisible capital that creates community networks such as

trust and mutual aid and invigorates the spiritual ties among the people in the community” (Morning newspaper of Nihon Keizai Shimbun, August 5th, 2004). Social capital provoked attention for the first time when Robert D. PUTNAM, Harvard University, published *Making Democracy work: Civic Traditions in Modern Italy*, 1993 (transl. by Jun’ichi KAWADA as the title *Tetsugakusuru Minshushugi—dento to Kaikaku no Shiminteki Kozo* (Philosophizing Democracy—Civic Structure of Democracy and Reform), Tokyo, NTT Publishing, 2001).

⁴ Coase Theorem is that “when there are not wealth effects, if efficiency agreement has been obtained after negotiation, the value production activity is a production activity of total value maximization no matter who decides, and depends neither on amount of asset on hand nor on negotiation power.”

⁵ An organization for charitable purpose is an organization that has the object of trading with third parties of unspecified majority and supplying them with goods or services free of charge or at an extremely low cost that will be enough to compensate for the prime cost, and it doesn’t distribute surplus, if any, among the members. The residual property on resolution is obliged to revert to the State, a local public entity, or else. In contrast, an organization for mutual benefit trades or can trade with third parties and its purpose is that the members will share or cooperate in facilities, equipment, and services, and endeavor for the individual members’ common profits and progress the individual members’ public welfare. Even if the organization gets surplus, it is not allowed to distribute it among members. The treatment of the residual property on resolution follows the articles of the organization.

⁶ The main points of the French Law on Association according to GAEC & SOCIÉTÉS are as follows: 1. Purpose: To make members’ knowledge and activities common for the purposes except profit distribution. 2. Members: At least 2 natural persons or judicial persons. 3. Source of revenue: Shares of the members. Subsidies, contributions, and donations are also possible. Movable or real properties can also be invested by the members. However, members cannot get shares of the profits corresponding to the investments. 4. Foundation procedures: The founder makes the articles of the organization and assigns the manager. For the public announcement, related documents should be submitted to the administrative organ and promulgated on the official daily gazette. 5. Management: Depends on the articles of the organization. In general, a board of directors is appointed and ordinary and extraordinary general meetings are held. Director qualifications are to have citizenship and never to have committed a felony. Alternation of the articles and directors shall be promulgated on another occasion. In an association that carries out an economic activity, financial responsibility of leaders’ error belongs with the leaders, and so does the financial responsibility of class action suit. 6. Features: To get legal subjectiveness by promulgation on the official daily gazette. There is no denying the possibility of an association making a profit, but the profit, if any, must not be distributed to the members. It is possible to get back the invested amount from the residual property on resolution only if there is such a regulation in the articles. Entry and withdrawal of members is free. 7. Taxation: Corporate tax is exempted if the activities are all non-profitable.

⁷ IKEDA, Saburo, “Risuku Bunseki Kotohajime (Introduction to Risk analysis)”, *Risuku, Kankyo oyobi Keizai* (Risk, Environment, and Economics), written and edited by IKEDA et al., Tokyo, Keiso-shobo, 2004, Chapter 3, was referred to and revised for this paper’s purpose.

⁸ IKEDA, Saburo, “Gurobaru Risuku Kanri to Yobo Gensoku (Global Risk Management and Prevention Principles)”, *Risuku, Kankyo oyobi Keizai* (Risk, Environment, and Economics), written and edited by IKEDA et al., Tokyo, Keiso-shobo, 2004, Chapter 4, p.59, was referred to and revised for this paper’s purpose.

⁹ See NAKANISHI, Junko, *Kankyo Risuku-gaku* (Environmental Risk Study), Tokyo, Nippon-Hyoron-Sha, 2004, and NAKANISHI, Junko, *Kankyo Risuku-ron* (Comments on Environmental Risk), Tokyo, Iwanami Shoten, 1995, etc.

¹⁰ According to AOKI, Masahiko, “Shigen, Kankyo Taio de Sekai Shudo (World-leading in resource and environment friendliness)”, Morning newspaper of Nihon Keizai Shimbun, August 21st, 2006.

¹¹ FIELD, B.C., transl. by Jiro AKITA, et al., *Environmental Economics: An Introduction (Kankyo Keizaigaku Nyumon, in Japanese)*, Tokyo, Nippon-Hyoron-sha, 2002, pp.250, 277, and 305, were referred to and revised for this paper’s purpose.

Note: This paper is a part of the result of Grants-in-Aid for Scientific Researches (Head investigator: Hiroshi Kumagai, Project No.: 15208021, and Head investigator: Kazuo Matsushita, Project No.: 15201005).

(受理日 2007年1月11日)